



**National  
Transportation  
Safety Board**

# Enhancing Fire Safety: Opportunities for Innovation

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Board Member

Annual Meeting and Symposium  
National Alliance for Advanced Technology Batteries  
January 22, 2014



NTSB



- 1) determining the probable cause of transportation accidents**
- 2) making recommendations to prevent their recurrence**



**NTSB**





All Modes



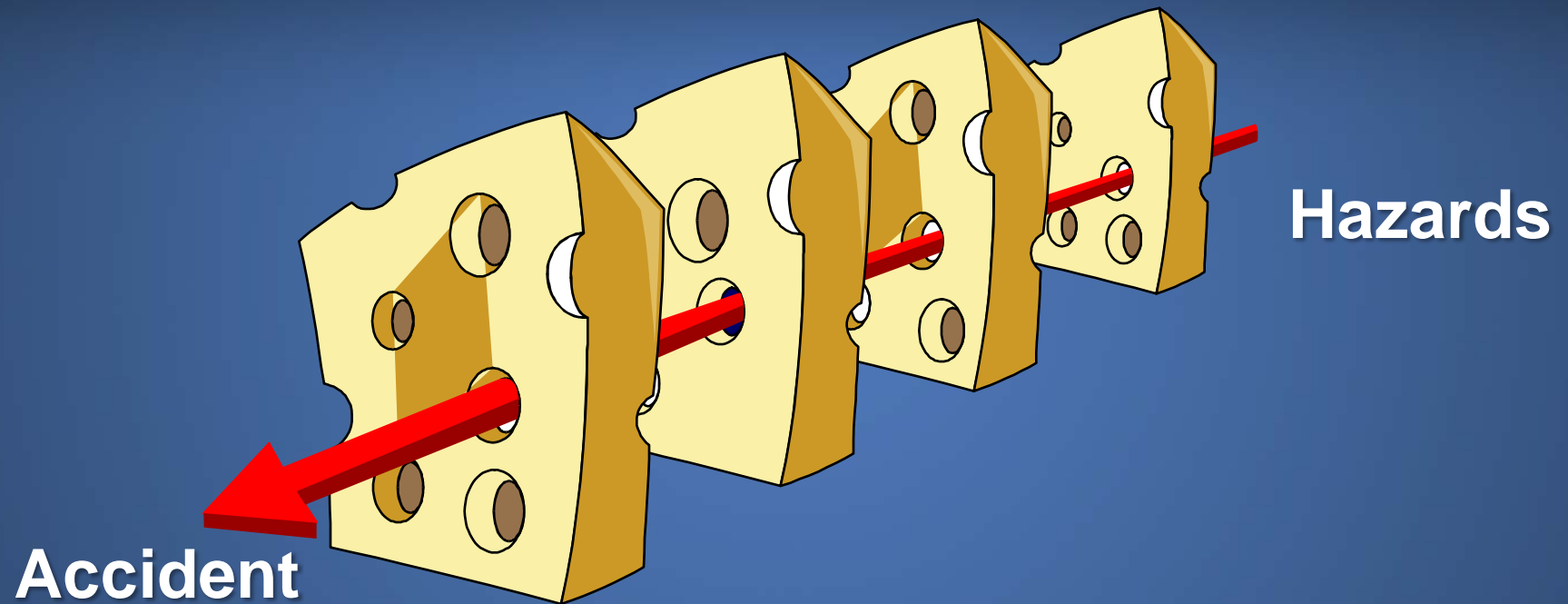
NTSB

# Independent Federal Agency: Created in 1967

- >132,000 accident investigations
- 13,500+ safety recommendations
- ~ 2,500 organizations/recipients
- 82% acceptance rate



# “Swiss Cheese” Model (Reason)



Successive layers of defenses, barriers, and safeguards



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# NTSB Characterized as:

‘moral compass and industry conscience’

NTSB Chairman Deborah A.P. Hersman



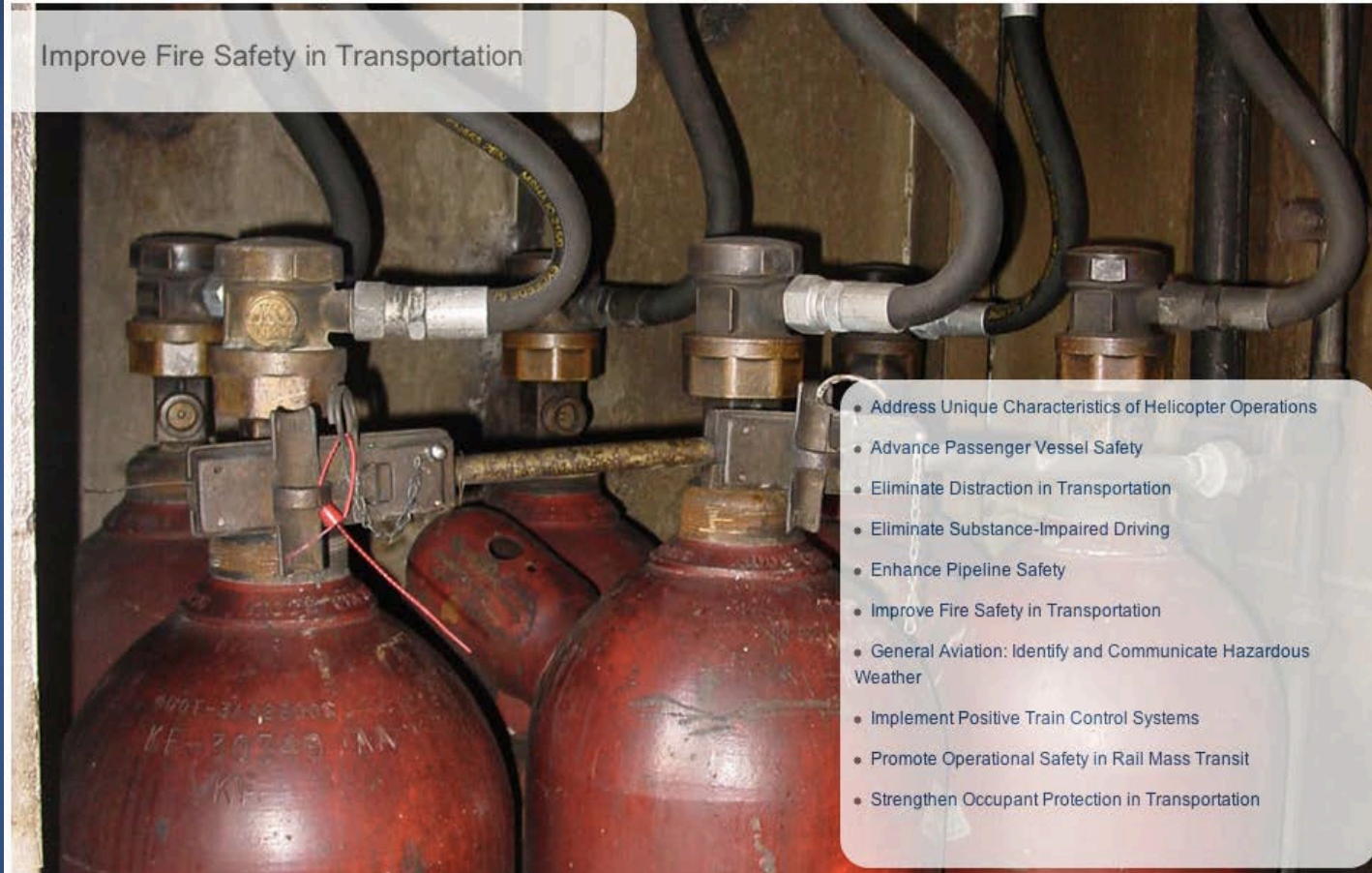
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# NTSB Most Wanted List

## MOST WANTED LIST

The Most Wanted List represents the NTSB's advocacy priorities. It is designed to increase awareness of, and support for, the most critical changes needed to reduce transportation accidents and save lives.

### Improve Fire Safety in Transportation



- Address Unique Characteristics of Helicopter Operations
- Advance Passenger Vessel Safety
- Eliminate Distraction in Transportation
- Eliminate Substance-Impaired Driving
- Enhance Pipeline Safety
- Improve Fire Safety in Transportation
- General Aviation: Identify and Communicate Hazardous Weather
- Implement Positive Train Control Systems
- Promote Operational Safety in Rail Mass Transit
- Strengthen Occupant Protection in Transportation



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# Fire Safety

- Prevention (materials, design)
  - Detection (early)
    - Suppression



# Fire Safety: Highway



**Figure 4.** Motorcoach tire on fire, witness photo from I-45 frontage road.  
(Courtesy of Dallas County Sheriff's Office)

Tire/Wheel Well Fire  
Wilmer, TX  
September 23, 2005

23 lives lost  
2 serious injuries  
19 minor injuries



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# Fire Safety: Marine



Figure 6. Smoke damage to outside of Massachusetts's main deck, starboard side.

Engineroom Fire  
Boston Harbor, MA  
June 12, 2006



NTSB



# Fire Safety: Aviation

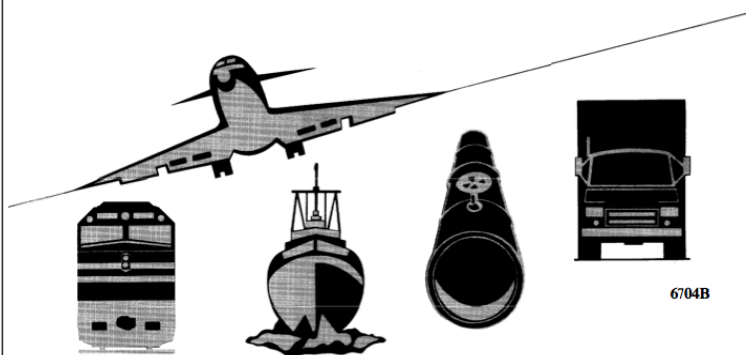
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NTSB/AAR-97/06  
DCA96MA054

## NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

### AIRCRAFT ACCIDENT REPORT

IN-FLIGHT FIRE AND IMPACT WITH TERRAIN  
VALUJET AIRLINES FLIGHT 592  
DC-9-32, N904VJ  
EVERGLADES, NEAR MIAMI, FLORIDA  
MAY 11, 1996



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# TWA 800 (July 17, 1996)



**Figure 29.** A photograph of the right side of the large three-dimensional reconstruction, with the support scaffolding visible.

Recommendations: A-96-174, -175, -176, -177



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# Fire Safety: Aviation



UPS 1307  
Philadelphia, PA  
February 7, 2006

Container fire, unknown source



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# Fire Safety: Aviation



**Figure 2.** Fire Damage to Top of Airplane

ABX Air 1611  
San Francisco, CA  
June 28, 2008

Oxygen system: hosing age, proximity to electrical



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# Lithium Ion Batteries

- Cargo
- Aircraft system
- Passenger
  - (carry-on, checked bags)



# Lithium Ion Battery Recommendations

- **To the FAA and PHMSA:** In collaboration with air carriers, manufacturers of lithium batteries and electronic devices, air travel associations, and other appropriate government and private organizations, establish a process to ensure wider, highly visible, and continuous dissemination of guidance and information to the air-traveling public, including flight crews, about the safe carriage of secondary (rechargeable) lithium batteries or electronic devices containing these batteries on board passenger aircraft. (A-08-01)





# UPS 6, Dubai, UAE (September 3, 2010)

## NTSB Testing (2012)



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# Most Recent Fire Safety Recommendations

- **To the FAA:** Ensure that cargo container construction materials meet the same flammability requirements as all other cargo compartment materials in accordance with 7 Title 14 *Code of Federal Regulations* 25.855. (A-12-69)



# Most Recent Fire Safety Recommendations

- **To the FAA:** Develop fire detection system performance requirements for the early detection of fires originating within cargo containers and pallets and, once developed, implement the new requirements. *Supersedes A-07-98 (A-12-68)*





# Most Recent Fire Safety Recommendations

- **To the FAA:** Require the installation and use of active fire suppression systems in all aircraft cargo compartments or containers, or both, such that fires are not allowed to develop. (A-12-70)



# B787 Battery Event



JAL, Boston, MA  
January 7, 2013



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April 11-12, 2013



3 panels  
18 panelists

[www.nts.gov](http://www.nts.gov)

# Queen of the West (April 8, 2008) Columbia River, near Rufus, OR



**Figure 1.** The *Queen of the West* under way. Photo by Majestic America Line.

Engineroom fire



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# Survivability

- Probable Cause (includes)

Contributing to the survivability of the vessel, and to the absence of injury or loss of life, was Majestic America Line's voluntary installation of an automatic fire detection system and a fixed fire suppression system.



# Asiana 214 (July 6, 2013)

## San Francisco, CA (SFO)



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# Fire Safety Advances

fuel tank explosion protection

fire-resistant flight recorders

heat-resistant evacuation slides

halon hand-held extinguishers

cargo compartment fire detection and suppression systems

low-heat and smoke interior cabin panels

lithium battery fire safety

burn-through-resistant cargo liners and aircraft insulation



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# Enhancing Fire Safety: What's Next?

- Best practices
  - industry driven
  - lead efforts
  - manage external interests
- Requirements
  - consistency
  - clear expectations
  - 'level playing field'





# Enhancing Fire Safety: What's Next?

- Innovation opportunity
  - multiple areas
  - differentiate
  - push change/‘envelope’
  - technology as catalyst





# National Transportation Safety Board